CONTAINER

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an expandable container, for example, according to the ISO Standard, particularly as a working space. Man-sized accessible containers of this type are also called "shelters" in English-speaking areas.

[0002] An expandable container is described, for example, in DE-G 92 16 314.9 and includes a basic container with foldable side walls as well as one or more expansion elements which can be moved out of the basic container. An expansion element has two side walls and one front wall. With the expansion element moved out, two folded-open side walls of the basic container form the roof wall and the floor wall of an expansion element. A disadvantage of this construction are the large sealing lengths which are required for the sealing of the container along the roof wall and floor wall. This presents a problem particularly when ABC (atomic, biological, chemical) tightness is demanded.

[0003] Another expandable container is described in EP 0 682 156 B1 and has a basic container as well as one or more expansion elements for expanding the interior space. The expansion element can be moved out of the basic

container. The expansion elements are box-shaped and, with the exception of the open side toward the basic container, are closed on all sides. For achieving an even floor within the entire container, a lifting device is also provided so that the expansion elements can be lowered with the result that, after the lowering step, the floor walls of the basic container and the expansion element are situated at the same level. In the construction with two expansion elements, the dimensions of the two expansion elements have to be selected such that one expansion element can be moved into the other expansion element.

[0004] DE 101 35 226 A1 describes an expandable container of the above-mentioned type which has a lifting device for achieving an even floor so that the expansion elements can be lowered and thereafter the floor walls of the basic container and of the expansion element are situated at the same level. The expansion elements are open toward the top. A side wall, which can be folded about a horizontal axis, is situated on the basic container and, when the expansion element has moved out, forms the roof wall of an expansion element. This construction achieves an improved standing height in an expansion element.

SUMMARY OF THE INVENTION

[0005] An object of the present invention is to provide an expandable container which, on one hand, has a sufficient standing height also in the expansion elements and, on the other hand, has a mechanically robust lifting device which is simple to operate.

[0006] This object has been achieved by providing that the lifting device is active between the folded-open side wall and an expansion element

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] These and other objects, features and advantages of the present invention will become more readily apparent from the following detailed description of currently preferred configurations thereof when taken in conjunction with the accompanying drawings wherein:

[0008] Figures 1a) to d) are vertical sectional views, respectively, of a four-step process for unfolding a container according to the invention;

[0009] Figure 2 is a vertical sectional view of a container according to the present invention with a moved-out expansion element;

[0010] Figure 3 is a vertical sectional view of a container according to the present invention with a moved-out and lowered expansion element;

[0011] Figure 4 is a sectional view along line B-B in Figure 2 of a container according to the present invention;

[0012] Figure 5 is a lateral perspective view of an expansion element with the lifting device according to the present invention;

[0013] Figure 6 is a vertical sectional view (corresponding to Figure 4) of a container according to the present invention showing three different conditions a) - c) with additional surface elements on the side walls of an expansion element;

[0014] Figure 7 is a vertical sectional view (corresponding to Figure 4) of a container according to the present invention showing three different conditions with another construction of the additional surface elements on the side walls of an expansion element; and

[0015] Figure 8 is a vertical sectional view of a container according to the invention (corresponding to Figure 2 or 3) showing two different conditions with additional surface elements on the front wall of an expansion element.

DETAILED DESCRIPTION OF THE DRAWINGS

[0016] Figures 1a) to d) show the individual steps during the construction of an expandable container according to the invention having two expansion elements 10, 20. Fig. 1a) shows the initial (or transport) condition. The box-shaped basic container 1 contains the two expansion elements 10, 20 (Fig. 1c). In this embodiment, the expansion element 20 has moved into the expansion element 10 which is slightly larger with respect to the length and height. The floor wall 15, 25 and the front wall 16, 26, respectively, of the two expansion elements 10, 20 as well as a side wall 27 of the interior expansion element 20 are visible. The basic container 1 has a floor wall 2, a roof wall 3 as well as two

foldable side walls 4, 5 which are each rotatably about a horizontal axis 41, 51 disposed on the upper edge of a container wall.

[0017] In Fig, 1b), the two foldable side walls 4, 5 are folded upward and are now situated essentially in a horizontal plane. The side surface of the basic container 1 and the folded-open side wall 4, 5 form a right angle. In this position, the folded-up side walls 4, 5 are supported on a linear actuator 55 or a like support whose length can be changed and which, with its other end, is arranged on the basic container 1. The support 55 may be constructed, for example, as a telescopable lifting cylinder (e.g., pneumatic, hydraulic, electromechanical).

[0018] In Fig. 1c), the two expansion elements 10, 20 have moved out completely. This takes place by way of rollers 13, 23 which engage in tracks 80 (see also Fig. 2) provided on the folded-up side walls 4, 5. Two tracks are advantageously provided for each expansion element. In addition, an expansion element 10, 20 has floor rollers 11, 21 in the floor area, which, during the moving-out, roll on the floor wall 15 of the larger expansion element 10 and on the floor wall 2 of the basic container 1, respectively. The folded-up side walls 4, 5 of the basic container 1 now form roof walls of the expansion elements 10, 20. A folded-up side wall 4 or 5 will therefore in the following also be called a roof wall depending on the context.

[0019] The moving-out of the two expansion elements 10, 20, in each case, takes place in the horizontal direction, i.e., without any change in the vertical direction. Thus, the floor levels of the expansion element 10, 20 and of the base container 1 differ in each case, the floor level of the basic container 1 being the lowest and the floor level of the small expansion element 20 being the highest. For example, the difference between the levels of the smaller expansion element and the basic container is approximately 100 mm, while the difference between the levels of the larger expansion element 10 and the basic container 1 is approximately 50 mm.

[0020] Fig. 1d) shows the completely unfolded container with lowered expansion elements 10, 20, so that now a uniform floor level is produced inside the entire expanded container. The lowering movement takes place in a parallel manner, i.e., in such a manner that the floor surface of an expansion element is oriented horizontally during the lowering operation and particularly when the end position is reached. The lowering of the expansion element 20 takes place on the two traveling carriages 157, 158 (likewise traveling carriages 147, 148 for expansion element 10), on which the above-mentioned rollers 13, 23 are arranged for the moving-out of the expansion elements 10, 20. The lowering is carried out by a lifting device which, in the embodiment illustrated here, is constructed as a cable winch as also seen in Fig. 5.

[0021] For a more detailed explanation of the lowering mechanism, reference is made to Fig. 2 in which the expansion element 20 has been moved

out completely from the basic container 1 but has not yet been lowered. The foldable side wall 5 of the basic container 1 had previously been folded from its vertical position of the transport condition upward into a horizontal position and is supported on the device 55 shown in dotted lines.

[0022] A track 80 is arranged on the foldable side wall 5 for guiding two traveling carriages 157, 158 via the rollers 23. In addition to the above-mentioned traveling rollers 23 (in the illustrated embodiment, four traveling rollers per carriage), a traveling carriage 157 or 158 has several (in the illustrated embodiment, two) guide rollers 150 (Fig. 4) for guiding a cable 160 of a cable winch 155 (Fig. 5). As illustrated in Fig. 4, the two traveling rollers 23 as well as one guide roller 150 of a traveling carriage 157 or 158 are advantageously arranged on the same pin. The cable 160 is fastened to the innermost guide roller 150 of the traveling carriage 158 adjacent to the basic container 1. Additional guide rollers 152 for the cable 160 are arranged in the area of the upper edge of the expansion element 20, specifically in each case below the traveling carriages 157, 158.

[0023] From the described fastening point of the cable on the interior traveling carriage 158, the cable 160 is alternately guided by the guide rollers 150 (Fig. 4) on the expansion element 20 as well as by way of guide rollers 152 on the traveling carriages 157, 158. Thereby, in the area of the traveling carriages 157, 158, one guide roller 152 of the expansion element, respectively, comes to be situated between two guide rollers 150 of a traveling carriage. By way of

another guide roller 154 in the area of a side wall 27 of the expansion element 20, the cable is finally guided to a cable winch 155 (Fig. 5) on the front wall 26 of the expansion element 20.

[0024] In the position illustrated in Fig. 2, the expansion element 20 is in its upper position. The top side of the side wall 27 of an expansion element 20 strikes against the stop 159 on a traveling carriage 157, 158. If the expansion element 20 now is to be lowered from the position illustrated in Fig. 2, the cable 160 has to be released by a certain length at the cable winch 155 (Fig. 5). As a result, the traveling rollers 152 and, with them, the expansion element 20 are lowered. To the extent that the point of gravity of an expansion element 20 is not significantly outside the center between the left side (side oriented toward the basic container) and the right side (exterior side) of the expansion element 20, the lowering for the left and the right side takes place in parallel. That is, no tilting of the expansion element 20 from the vertical line takes place.

[0025] In order to ensure a reliable vertical and parallel lowering, guiding devices in the form of metal plates (Fig. 4) can be mounted on the traveling carriages 157, 158. The metal plates 96 laterally reach around the upper area of a side wall 27 and have vertically extending gaps 97 or rails into which pins 98, pivots or bolts, engage and are connected with a respective expansion element 10, 20. In addition, diagonal tie bars 101 (shown in phantom lines in Fig. 3) can be mounted for supporting the expansion elements 10, 20 in the moved-out condition.

[0026] The described lowering movement is completely reversible. When the expansion element 20 is lifted, the cable winch 155 is operated in the reverse direction, so that the cable 160 is brought in. The expansion element 20 is lifted until the stops 159 on the traveling carriages 157, 158 strike against the top side of a side wall 27. The expansion element 20 can now be pushed into the basic container 1.

[0027] Fig. 5 is a more detailed view of the cable guidance of the cable winch. Previously, the lifting mechanism was described with respect to a single track by way of which with a cable 160, exactly one side of the expansion element 20 was lowered. Advantageously, the cable for the lowering of the other side of the expansion element is coupled with the same cable winch 155, so that finally only one lifting device has to be operated as illustrated in Fig. 5. The two cables for the left and the right side have the reference numbers 160 and 161. They are coupled with the central cable winch 155 on the front wall 26 of the expansion element 20.

[0028] After the conclusion of the lowering operation, surrounding gaps occur between an expansion element and the pertaining roof wall. In order to close these, additional surface elements can advantageously be provided. For this purpose, Fig. 6 shows a first embodiment for covering the gap between the side wall 27 of an expansion element 20 and the roof wall 5. In this embodiment, the additional surface element has a two-shell construction (outer shell 70a,

inner shell 70b), the two shells being arranged on the roof wall 5 in a foldable manner. The hinge 71 for the outer shell 70a is not arranged directly on the roof wall 5 but is offset downward by a cross-sectional width of the track 80 (the latter is used for guiding the expansion element 20 via the rollers 23 when the expansion element is moved out of the basic container, as described above), so that a folding-away by approximately 90 degrees is permitted without striking against the track 80.

[0029] Fig. 6a) shows the container when the side wall 5 is folded up, while the expansion element is still in the basic container 1. The two shells 70a, 70b of the additional surface element are still situated parallel to the roof wall 5. Before the moving-out of the expansion element, the outer shell 70a is folded downward.

[0030] Fig. 6b) shows the situation with the moved-out but not yet lowered expansion element. On the outer shell, sliding seals 40, 41 are provided which slide over the side wall 27 during the moving-out and lowering of the expansion element. The inner shell 70b is still in its initial position. After the expansion element has been lowered, the inner shell 70b is folded down (Fig. 6c). It has a contact seal 42 for sealing the container.

[0031] Fig. 7 shows another embodiment of an additional surface element between the side wall 27 and the roof wall 5. In this embodiment, the additional surface element is placed on the side wall 27 of an expansion element 20 and can

be moved in a vertical manner with respect to the side wall 27. The surface element also has a two-shell construction (inner shell 75b, outer shell 75a).

[0032] In Fig. 7a), the expansion element is still in the basic container 1. The track 80, via which the expansion element 20 is guided out of the basic container 1 when it is moved out, in comparison to the embodiment according to Fig. 4, has additional paths 77 for the guiding of an inner and an outer shell of the additional surface element.

[0033] Fig. 7b) shows the situation with the moved-out expansion element 20, the latter still being in its highest position. The two-shell additional surface element is now visible and is placed on the side wall 27. The inner and outer shells 75a, 75b are connected by a web 75c. Each shell 75a, 75b has rollers 76 which engage in the paths 77 when the expansion element 20 is moved out. Sliding seals 45, 46 are present on each shell 75a, 75b.

[0034] Fig. 7c) shows the container with the lowered additional box element (side wall 27). The additional surface element, which is guided in the horizontal paths 77, remains in its original position, while the upper edge of the side wall 27 moves downward inside the two shells 75a, 75b.

[0035] Fig. 7 also shows another additional surface element (inner shell 170b) which is foldably arranged on the roof wall 5 via hinge 171. This additional element 170a is used for closing the gap between the front side 26 (Fig. 8) of the

expansion element 20 and the roof wall 5. The pertaining outer shell 170a is illustrated in Fig. 8. In Fig. 7c, the inner shell 170b is folded down and is locked in the vertical position by a turning lock 172.

[0036] Fig. 8 shows the outer shell 170a of the additional surface element for the closing of the gap between the front wall 26 of an expansion element 20 and the roof wall 5. The additional surface element 170a is rigidly arranged on the roof wall 5. When the roof wall 5 is folded down into its vertical starting position (i.e., transport configuration of the container), a space for receiving the additional surface element 170a, which space is open to one side, has to be provided at the lower edge of the basic container 1. The additional surface element 170a has a sliding seal 48 at its lower edge for sealing the gap between the additional surface element 170a and the front wall 26 of the expansion element 20.

[0037] In Fig. 8b), the expansion element 20 has moved out of the basic container 1 but has not yet been lowered. The expansion element 20 contacts the seal 48. During the lowering of the expansion element 20, the seal 48 slides on the front wall 26. Fig. 8a) shows the situation with a completely lowered expansion element 20.

[0038] The embodiments illustrated in the drawings each show constructions with exactly two expansion elements. Of course, also constructions with exactly one or more than two expansion elements are contemplated and

within the scope of the present invention. The moving-out operation as well as the lowering operation take place analogously to the illustrated sequences for the individual expansion elements 10, 20.

[0039] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.